Remarks

The applicants have amended claim 1 to make it clear, as was intended to be understood by the wording, that only the total pressure is varied. The flow rates in step *e* remain the same as in step *a*.

While the applicants appreciate that a claim can be held obvious if the combination claimed solves a problem different from that solved by the applicant, a solid appreciation of the problem solved by the applicant is a good place to start in analyzing the invention. If the applicant really has made a real contribution to the art, one must exercise caution in holding that the combination is obvious merely because it also solves some hypothetical problem.

The problem the applicants faced was how to make high optical quality silica films in the manufacture of waveguides. The problem noted by the applicants is that due to various chemical interactions, compounds are formed that create undesirable absorption bands. The problem facing one skilled in the art is how to eliminate such bands.It was by no means known to one skilled in the art that PECVD could result in the production of such films. There are other techniques for making such films, such as flame hydrolysis, and it was not obvious to a person skilled in the art that it would be possible to make films of the quality achieved by the invention using PECVD. Therefore it was not obvious that PECVD was the best route.

The applicants have taught how to make such films of silica free of B and P, namely that they can be made by PECVD if the protocol claimed is followed. There are an almost infinite variety of ways in which the various process parameters can be varied, and one skilled in the art could play around with the various parameters almost indefinitely without coming up with high quality film. The invention puts some order into the process and teaches how to make such films without undue experimentation. It is easy to say in hindsight that the process merely involves adjusting routine parameters, but the reality is that a person skilled in the art, absent the teachings of the invention, would not have been able to make such films by mere routine adjustment of the process parameters because they are all inter-related. When one is adjusted, it can have a negative impact on the others, so that one skilled in the art would be continually adjusting the parameters without

coming up with a satisfactory film. One skilled in the art would likely give up entirely, and try some other approach, such as flame hydrolysis.

The invention is based in part on the unexpected result that the flow ratios are not an important factor in the definition of the optical qualities of silica films, contrary to the belief in the prior art, (see page 32, line 20), and that by setting the gas flows at fixed values, one can find the optimum point merely by adjusting the total pressure. This concept is nowhere taught or suggested in the prior art.

In the recent Supreme Court decision, *KSR INT"L CO. v Teleflex Inc.*, the court looked at the obviousness of combination patents, and there is no apparent reason why its opinion should not apply to a claim comprising a combination of steps. In particular, the court stated:

> "In determining whether the subject matter of a patent claim is obvious, neither the particular motivation now the avowed purpose of the patentee controls. What matters is the objective reach of the claim. If the claim extends to what is obvious, it is invalid under §103. What matters is the objective reach of the claim. One of the ways in which a patent's subject matter can be proved obvious is by noting that there existed at the time of invention a known problem for which there was an obvious solution encompassed by the patent's claims."…
>
> "Under the correct analysis, any need or problem known in the field of endeavour at the time of invention and addressed by the patent can providing a reason for combining the elements in the manner claimed." *KSR INT"L CO. v Teleflex Inc.*, Case No. 04-1350 (emphasis added)

The Examiner has combined three disparate patents and argued that they collectively teach the combination of method steps claimed. Clearly, they do not teach how to make high quality optical films. So what, known problem do they address that leads to the claimed combination? In the applicants' respectful submission, the Examiner's analysis is of a hindsight nature that cannot be fairly said to address any known problem.

Ohja is concerned with making optical films and teaches a reflow process for removing inhomogenities cause by imperfections in the lattice. Ngo teaches how to make silica films, but Ngo is concerned with integrated circuits where the electrical properties are paramount, and there is no interest in the optical qualities of the films. Ngo is non analogous art in that it is not in the same field of endeavour as the present application. The problems associated with the deposition of satisfactory films for an electrical circuit are quite different from those associated with optical films. In the latter the dielectric

constant and mechanical properties are important, but no importance is attached to the optical quality of the films. It would not matter that a dielectric silica film in an integrated circuit has certain optical absorption bands.

The Examiner admits that the combination of Ohja and Hsieh does not teach the optimization process claimed, but arguments that the missing steps are obvious in view of Hsieh and routine experimentation.

Like Ngo, but unlike Ohja, Hsieh is concerned with the electrical properties of deposited films. In the first paragraph Hsieh mentions potential applications such as

> "gate insulators, interlayer isolations, lithographic masks, passivation layers for integrated circuits, and compound semiconductor device structures, as well as the primary gate dielectrics for amorphous silicon thin film devices".

Despite having a long catalogue of uses, the mention of optical films is striking by its absence. It is clear that Hsief is in no way concerned with optical films, which really represent an entirely different art.

In considering this question, the Federal circuit stated *in In re Wood*, 202 USPQ 171, that

> "we presume knowledge by the inventor of all the prior art in the field of his endeavour. However, with regard to prior art outside the filed of his endeavor, we presume knowledge from those arts reasonably pertinent to the particular problem with which the inventor was involved." (emphasis added)

And in *In re Clay*, 23 USPQ 2d 1058, the Federal circuit stated:

> [a] reference is reasonably pertinent if … it is one which, because of the matter with which it deals, logically would have commended itself to the inventor's attention in considering his problem…If a reference has the same purpose as the claimed invention, the reference relates to the same problem… [I]f it is directed to a different purpose, the inventor would accordingly have less motivation or occasion to consider it."

While Hsieh teaches in very loose terms the control of "chemical, physical, mechanical, and electrical properties" (see first paragraph), and while the word physical might be said to encompass optical properties, it is noteworthy that despite giving a detailed list, Hsieh fails to mention optical properties. One skilled in the art seeking to improve optical properties of films would not presume Hsieh to be of relevance in that it is clear Hsieh is not concerned with the manufacture of optical films, and Hsieh clearly fails to give any

guidance about how to obtain high quality optical films. The fact that pressure may affect the physical properties can hardly be regarded as a suggestion for one skilled in the art to vary the pressure in the manufacture of silica waveguides and expect to obtain a useful result of any sort.

The Examiner goes on to say that Hsieh teaches that chamber pressure is a known result effective variable. However, for such reasoning to apply there has to be a nexus between the variable and the end result. For example, if it is known that temperature at which a process is carried out affects the dielectric constant of the film, it is generally not considered inventive merely to find the temperature at which the dielectric constant is optimum. However, by contrast if it was not known that temperature affected the optical characteristics, it could well be inventive to find the temperature at which the optical characteristics were found. The mere reference to physical properties in Hsieh, especially in the context of Hsieh, cannot be regarded as a teaching, express or otherwise, that pressure is a result effective variable for the optical properties of the films.

Hsieh teaches the use of FTIR spectroscopy for the analysis of the hydrogen-bonding configurations of the films. FTIR spectroscopy is merely used as a tool in this case to perform a chemical analysis of the structure. This is not a teaching that Hsieh is interested in the optical qualities of the films obtained, any more than a doctor who uses a stethoscope is interested in the audio properties of the chest. The doctor is merely using the stethoscope to learn about the physiology of the patient. Like Hsieh merely teaches using FTIR to learn about the chemical structure of the films that are used in semiconductor applications.

However, more importantly, in dissecting the invention into its component parts, the Examiner has overlooked the overall teaching of the invention, namely that it claims a route to obtaining high quality optical films by setting the flow rates at fixed values, varying the deposition pressure, comparing FTIR spectra, and based on this comparison selecting the deposition pressure. The invention is based on the unexpected result that by varying only the deposition pressure, it is possible to find the essentially eliminate the undesirable harmonic oscillators. When the prior art as a whole is looked at objectively, it is clear that it does not teach this methodology. It is easy to say that a person skilled in the art, with the benefit of hindsight and the applicants teachings, could have come up with

the methodology claimed, but in reality there is no suggestion in the prior art that he would have done so faced with the problem addressed by the inventors, or indeed any known problem.

In a nutshell, Ohja + NgO + Hsieh do not make a permissible combination because neither NgO nor Hsieh are concerned with the optical properties of silica films, and even if they did, they do not result in the specific methodology set forth in claim 1 because there is no teaching of setting the flow rates and varying only the total deposition pressure, and performing the comparison more particular as set forth in claim 1. The fact that total deposition pressure is controlling is an unexpected result not taught in the art.

In recent KSR case, *supra*, the Supreme Court case reminded us of the importance of an unexpected result:

> The fact that the elements worked together in an unexpected and fruitful manner supported the conclusion that Adams's design was not obvious to those skilled in the art.

The elements in the present case would refer to the recited method steps that lead ultimately to the production of high quality silica films free of B and P in an unexpected manner because contrary to expectations it is not necessary also to vary the flow rates, which could result in an almost infinite number of possible methods that would present the person skilled in the art with a problem far beyond mere routine experimentation.

With regard to claim 21, it is respectfully submitted that the combination of Ohja and NgO is impermissible because Ohja is non analgous art in that it has nothing to do with the making of optical quality films, which is a very different art from the art of making dielectric films for use in semiconductor applications. The problems encountered and the properties desired are entirely different. Moreover, there is no teaching that total pressure, or indeed any of the taught variables, is a result effective variable for optical quality, so finding a value at which the optical qualities are optimized can, and in this case does, represent a patentable invention. There is no teaching that the variables optimized in accordance with the teachings of NgO would be the same as those optimized for optical quality.

Reconsideration and allowance are thus respectfully requested.

Respectfully submitted,

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